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SOCIETAL SUSTAINABILITY VIA FINTECH ADOPTION: EXAMINING THE MEDIATING ROLE OF FINANCIAL INCLUSION UNDER PERCEIVED BENEFITS AND RISKS

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Abstract: While FinTech is rapidly reshaping Indonesia's financial landscape, there remains limited understanding of how young users, particularly Gen Z and Millennials, evaluate the trade-offs between perceived benefits and risks within this context. Addressing this gap, this study examines FinTech users in Surabaya (n = 142 valid responses) using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings reveal a clear behavioral pathway in which monetary and non-monetary benefits do not directly influence FinTech adoption. Instead, these benefits significantly enhance Financial Inclusion, which functions as a critical prerequisite for adoption. Risk perceptions operate at different stages of the process. Security concerns significantly reduce perceived Financial Inclusion, while regulatory ambiguity directly weakens FinTech adoption. In contrast, financial risk shows no significant behavioral effect. The results further indicate that FinTech adoption does not significantly contribute to societal sustainability, suggesting that broader social outcomes depend more on structural and institutional enablers than on individual uptake alone. Overall, this study clarifies the central mediating role of Financial Inclusion and underscores the importance of secure user experiences and clear regulatory frameworks in translating digital participation into sustainable societal impact.

Keywords: *FinTech Adoption, Financial Inclusion, Societal Sustainability, Perceived Benefits, Perceived Risks*

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1. Introduction

Financial technology (FinTech) has shifted from a niche innovation into a major force shaping the global financial system. It now influences how individuals and firms handle payments, savings, credit, and insurance. Moreover, FinTech is increasingly recognized for its potential to improve financial inclusion in emerging economies where access, literacy, and trust remain uneven (World Bank, 2025). Global institutions such as the World Bank, United Nations, and OECD highlight that digital finance supports the Sustainable Development Goals (SDGs) when users can access services affordably and safely. In this sense, FinTech functions not only as an economic instrument but also as a channel for broader social participation. Yet, rapid digital expansion also exposes users to vulnerabilities when regulation, literacy, or cybersecurity fall behind (Bank for International Settlements, 2023).

These global trends form the backdrop for Indonesia's ongoing transition toward a digital financial ecosystem.

Indonesia now accounts for nearly 40 percent of Southeast Asia's digital-economy value (International Trade Administration, 2024). This growth is fueled by the rapid uptake of national technologies such as the QRIS system, which by mid-2025 had reached approximately 57 million users and 39.3 million merchants, generating 6.05 billion transactions valued at IDR 579 trillion (Bank Indonesia, 2025). While this dynamic suggests a thriving ecosystem, mirroring adoption trends in other emerging markets driven by convenience and promotional incentives (Gupta et al., 2023), usage patterns reveal a different behavioral reality. Surprisingly, only about half of financially included adults actively use digital financial services (World Bank, 2024; OJK, 2024). Even younger users, despite high digital confidence and frequent FinTech usage, demonstrate inconsistency in the quality of their financial behavior, particularly in decision-making discipline, risk awareness, and long-term financial readiness, rather than in usage frequency (Yusup & Hongdiyanto, 2023).

These contradictions are especially visible among Gen Z and Millennials. Although they are often characterised as digitally competent, their FinTech use is frequently shaped by impulsive spending, excessive borrowing, data-sharing misuse, and lifestyle-driven decision-making (Salma, 2024). Studies show that digital natives often overestimate their digital competence while underestimating security and privacy risks (Hiew et al., 2024). Empirical evidence further indicates that perceived risks significantly influence adoption among younger users, even when perceived benefits are strong (Hassan et al., 2025). As a result, adoption does not necessarily guarantee financial stability; without adequate literacy and governance, FinTech may reinforce vulnerability instead of reducing it. Surabaya provides a relevant setting for examining these dynamics. As Indonesia's second-largest city and a regional hub for trade and services, Surabaya exhibits high levels of youth-driven FinTech activity despite the concentration of national digital-finance infrastructure in Jakarta (Asosiasi Fintech Indonesia, 2024). The city records some of the highest rates of QRIS transactions among young users, driven largely by convenience and promotions (Pratama & Anas, 2024). However, continued digital-finance engagement depends on trust, literacy, and confidence, which remain uneven across Indonesian users (Setiawan et al., 2023). This contrast between high adoption and uneven capability positions Surabaya as a representative case to analyse whether rapid FinTech expansion empowers young users or deepens financial vulnerability.

The impact of FinTech adoption also extends to the broader question of societal sustainability. The primary pathway to achieving this objective is financial inclusion (Mamun, 2025). Financial inclusion is widely recognised as a channel for poverty reduction, resilience building, and equitable participation when supported by trust and secure systems (Ozili, 2024). Furthermore, digital tools support micro- and small-enterprise innovation, contributing to employment and local adaptability (Campanella et al., 2025; Ullah & Begum, 2025). Yet these benefits remain fragile. Unregulated digitalisation can heighten cyber-fraud, amplify exclusion, and undermine the very sustainability objectives it aims to advance (BIS, 2023). Although global attention to digital inclusion is increasing, limited empirical evidence assesses whether FinTech usage in emerging markets translates into long-term societal sustainability. Recent studies highlight the need to connect adoption with broader social impact (Hiew et al., 2024), but such relationships remain underexplored in Indonesia.

To address this gap, the present study integrates two complementary theoretical perspectives. Valence Theory (Peter & Tarpey, 1975) explains how individuals assess new technologies by weighing perceived benefits against perceived risks. This evaluation, in turn,

shapes micro-level adoption decisions. Sustainable Information Society (SIS) Theory (Fuchs, 2017) then extends this logic by examining how digital innovation transforms social and institutional structures. The theory highlights that participation must align with equity and sustainability objectives. When combined, these theories offer a multidimensional framework, in which benefit–risk evaluations drive individual adoption, while systemic capability, governance, and digital equity determine whether such adoption contributes to societal sustainability.

2. Literature Review

Valence Theory

Valence Theory explains technology adoption as a process in which individuals evaluate potential benefits against perceived risks and form adoption decisions based on the net expected value (Peter & Tarpey, 1975). In the context of digital finance, adoption intention is strengthened by perceived usefulness, efficiency, and convenience, while concerns related to fraud, privacy intrusion, and data misuse act as deterrents (Abdul-Rahim et al., 2022). Trust plays a critical role in this evaluation by reducing perceived risk and enhancing the value of anticipated benefits (Appiah & Agblewornu, 2025). Empirical studies further indicate that while performance expectancy generates positive motivation, privacy concerns and reliability doubts introduce a countervailing force that can weaken adoption decisions (Hoque et al., 2024; Changchit et al., 2024). Evidence from Indonesia aligns with this framework, showing that although service usefulness encourages FinTech adoption among Gen Z and Millennials, users remain cautious without sufficient confidence in data security and institutional reliability (Setiawan et al., 2023). Accordingly, this study conceptualizes monetary and non-monetary benefits as sources of positive valence, while financial, regulatory, and security risks represent negative valence shaping FinTech adoption behavior.

Sustainable Information Society

Complementing this individual-level perspective, Sustainable Information Society (SIS) Theory emphasizes that digital transformation becomes socially sustainable only when participation is supported by equitable access, institutional trust, and adequate user capability (Fuchs, 2017). Technological innovation alone is therefore insufficient to generate meaningful inclusion. In digital finance, sustained participation depends not only on users' technical readiness but also on the reliability of governance structures and regulatory frameworks. Prior studies demonstrate that transparent management practices and robust security systems foster trust and long-term engagement, whereas unclear rules and weak consumer protection undermine inclusive participation even when adoption levels are high (Campanella et al., 2025; Odei-Appiah et al., 2022). Empirical evidence from Indonesia reinforces this argument, indicating that perceived usefulness and trust encourage FinTech participation, while limited literacy and regulatory awareness continue to constrain meaningful engagement (Setiawan et al., 2023). Guided by SIS Theory, this study interprets FinTech outcomes in Surabaya through the interaction of user capability, institutional trust, and access conditions as determinants of inclusive and sustainable financial participation.

Perceived Benefit

Perceived benefits represent the positive evaluations that encourage individuals to engage with FinTech services.

Monetary Benefit

Monetary benefits refer to the perceived economic value users obtain from FinTech, including lower transaction costs, cashback, discounts, and improved financial efficiency.

These tangible advantages reduce cost-related barriers and support both initial adoption and continued use (Saif, 2024; Ramayanti et al., 2023). In addition, monetary benefits contribute to financial inclusion by enabling participation among individuals who were previously excluded from formal financial systems. When digital financial services are perceived as efficient and reliable, they are more likely to become part of users' daily routines, particularly among lower-income groups for whom affordability builds confidence and familiarity (Jaiswal et al., 2023; Sinha et al., 2024). Consistent with Valence Theory, monetary benefits strengthen adoption intentions when perceived positive outcomes outweigh perceived uncertainties, provided that users trust the reliability of the system (Appiah & Agblewornu, 2025). Based on this discussion, the following hypotheses are proposed:

H1a: Monetary benefit significantly affects financial inclusion.

H4a: Monetary benefit significantly affects FinTech adoption.

Non-Monetary Benefit

Non-monetary benefits refer to the value derived from the usage experience itself, such as convenience, usability, reliability, and a sense of control. These factors reduce effort and psychological uncertainty, allowing digital financial services to be used with greater ease and confidence. When FinTech systems are intuitive and dependable, they are more likely to be integrated into daily financial activities and maintained over time, rather than used only during promotional periods (Hoque et al., 2024; Setiawan et al., 2023). Prior studies indicate that effort expectancy and ease of use play an important role in sustaining long-term adoption (Changchit et al., 2024). Trust and perceived control further support this process by reducing security-related concerns, which remain salient among Gen Z users who are sensitive to cybersecurity risks (Hassan et al., 2025). As users become familiar with tools such as QR-based payments, repeated use gradually develops into stable financial routines that support more consistent participation (Irianto & Chanvarasuth, 2025). These non-monetary benefits therefore influence not only access but also the quality of financial inclusion, enabling users to move beyond passive adoption toward more capable and informed financial management. Based on this discussion, the following hypotheses are proposed:

H1b: Non-monetary benefit significantly affects financial inclusion.

H4b: Non-monetary benefit significantly affects FinTech adoption.

Perceived Risks

Perceived risks represent the negative evaluations that users consider when deciding whether to engage with FinTech services.

Financial Risk

Financial risk refers to perceived threats of monetary loss or transaction failure, including fraud, unauthorized withdrawals, or system malfunctions. Within Valence Theory, financial risk functions as a negative valence that users weigh against expected benefits, while Sustainable Information Society (SIS) Theory links this risk to institutional reliability. When consumer protection mechanisms are weak, perceived financial risk increases and undermines user trust. However, the presence of financial risk does not necessarily prevent FinTech usage. Instead, it shapes the level of caution users apply when engaging with digital financial services. When platforms provide clear safeguards, transparent complaint mechanisms, and effective compensation procedures, users are often willing to tolerate a certain degree of uncertainty (Appiah & Agblewornu, 2025). Conversely, weak protection increases fear of loss and can outweigh the perceived convenience of FinTech, thereby discouraging adoption (Zhao & Khaliq, 2024). Empirical evidence suggests that the impact of financial risk depends on users' financial literacy, regulatory clarity, and prior experience.

Clear regulations and adequate literacy enable users to manage uncertainty more effectively, while supportive institutional responses can restore confidence after negative experiences (Ly, 2024; Aljaradat & Shukla, 2025). This indicates that financial risk is not a fixed barrier but a challenge that can be mitigated through transparency and education (Mandić, 2025). Based on this discussion, the following hypotheses are proposed:
H2a: Financial risk significantly affects financial inclusion.
H5a: Financial risk significantly affects FinTech adoption.

Regulatory Risk

Regulatory risk refers to uncertainty related to laws, government policies, and the enforcement of consumer rights. Even when FinTech services are perceived as useful, uncertainty regarding institutional protection during disputes can create strong hesitation among users. This reflects the logic of Valence Theory, where perceived participation costs extend beyond monetary loss to include psychological concerns related to institutional credibility. From the perspective of SIS Theory, regulatory readiness is a critical prerequisite for sustainable digital participation, as a weak legal framework limits meaningful engagement. Global evidence demonstrates that clear and consistent regulatory environments encourage FinTech adoption by signaling institutional reliability and predictability (Khan et al., 2023; Vijayagopal et al., 2024). When governance structures are visible and effective, users are more confident in committing to digital financial services (Ferilli et al., 2024). In contrast, regulatory fragmentation in Indonesia, including overlapping mandates and weak consumer protection, remains a source of anxiety for users and constrains deeper participation (Fidhayanti et al., 2024). In such contexts, regulatory uncertainty may lead users to limit their engagement or avoid FinTech services altogether, despite potential benefits. Based on this discussion, the following hypotheses are proposed:
H2b: Regulatory risk significantly affects financial inclusion.
H5b: Regulatory risk significantly affects FinTech adoption.

Security Risk

Security risk refers to perceived threats related to unauthorized access, data breaches, and system failures that compromise personal or financial information. This risk dimension emphasizes data confidentiality, integrity, and user control, distinguishing it from financial risk and regulatory uncertainty. Within Valence Theory, security risk represents a negative valence that directly reduces adoption intentions when users doubt the effectiveness of safeguards. Confidence increases when security measures such as encryption, multi-factor authentication, and transparent data policies are perceived as reliable. Beyond technical features, cybersecurity also shapes institutional credibility. Fragmented enforcement and weak governance expose digital ecosystems to cyber threats and weaken public trust, while coordinated regulation and strong data-protection practices reinforce system reliability (AlBenJasim et al., 2024; Zhang et al., 2023). Empirical studies consistently show that perceptions of data protection and cybersecurity strongly influence FinTech adoption, as trust reduces uncertainty and supports sustained engagement (Jafri et al., 2024; Aljaradat & Shukla, 2025). In Southeast Asia, concerns regarding mobile-wallet security have been shown to shape continued usage, with privacy concerns prompting discontinuation even when usability remains high (Rahman et al., 2024). In Indonesia, persistent concerns over fraud and verification reliability further restrict meaningful participation, underscoring the importance of secure infrastructure, user education, and responsive institutional support. SIS Theory emphasizes that sustainable engagement emerges only when security infrastructure and user

capability jointly support inclusive participation. Based on this discussion, the following hypotheses are proposed:

H2c: Security risk significantly affects financial inclusion.

H5c: Security risk significantly affects FinTech adoption.

Taken together, perceived benefits and perceived risks form an evaluative environment through which users assess their ability and willingness to engage with FinTech services. These perceptions shape whether individuals feel sufficiently capable and supported to participate in formal financial systems. Financial inclusion therefore serves as the behavioral channel through which perceived benefits and risks are translated into actual FinTech usage.

Financial Inclusion

Financial inclusion refers to the ability of individuals and businesses to access and use financial services that are affordable, useful, and safe. In a digital context, access alone is insufficient to ensure meaningful inclusion, as effective participation also requires digital capability, trust, and institutional support. Recent frameworks describe financial inclusion as a combination of accessibility, literacy, regulatory clarity, and perceived safety (Ha et al., 2025). This perspective aligns with Sustainable Information Society (SIS) Theory, which emphasizes that meaningful participation depends not only on technological availability but also on a stable and supportive institutional environment.

When these conditions are present, financial inclusion functions as a key mechanism linking FinTech development to broader economic stability. Evidence from developing economies shows that digital innovation strengthens financial systems only when users are able to convert basic access into active and sustained participation (Ullah & Begum, 2025). Similar patterns are observed in the banking sector, where digital tools contribute to lower credit risk by expanding participation in formal financial systems (Metawa et al., 2023). These findings suggest that financial inclusion is not merely an outcome of technological advancement, but a prerequisite for digital financial systems to operate effectively.

At the individual level, inclusion is shaped by user capability and perceived safety. Digital literacy enables users to understand and utilize FinTech features effectively, while clear and reliable regulations provide confidence to sustain usage over time (Amnas et al., 2024). Empirical studies indicate that individuals with stronger digital financial capability and trust in platform security are more likely to adopt, engage with, and sustain participation in digital financial services (Dinh The Hung et al., 2025; Januardha & Cahyono, 2025). In Indonesia, this distinction between rapid adoption and sustained participation is particularly evident among Gen Z and Millennials. Although these groups are attracted by the convenience of FinTech applications, continued usage is unlikely without sufficient literacy and a clear understanding of associated risks (Setiawan et al., 2023). This pattern reflects the logic of Valence Theory and SIS Theory, which emphasize that individual adoption must be supported by reliable governance structures. Based on this discussion, the following hypothesis is proposed:

H3: Financial inclusion significantly affects FinTech adoption.

Fintech Adoption

FinTech adoption extends beyond the initial decision to download or try a digital financial application. It reflects the continued integration of digital services into users' daily financial routines, distinguishing occasional trial from habitual use. The transition from novelty to sustained usage depends on practical considerations, including perceived value, compatibility with existing habits, and ease of interaction (Jaiswal et al., 2023; Hoque et al.,

2024). Empirical evidence further indicates that usability and trust in service reliability play an important role in transforming initial interest into regular usage (Asif et al., 2023).

This adoption process aligns with Valence Theory, which explains that users continuously evaluate perceived benefits against perceived risks when deciding whether to maintain usage. In the Indonesian context, usefulness and innovation often act as strong incentives for initial adoption. However, barriers such as limited digital literacy and concerns related to security and privacy frequently constrain deeper engagement (Setiawan et al., 2023). These conditions suggest that a well-designed interface alone is insufficient to sustain adoption. Users also require visible institutional safeguards and reliable protection mechanisms to feel confident in continued use (Zhang et al., 2023; Jafri et al., 2024).

When FinTech services are adopted on a sustained basis, broader benefits for the financial system begin to emerge. Repeated usage builds familiarity and confidence, enabling users to participate more actively and consistently in formal financial systems (Ullah & Begum, 2025). Among Indonesian youth, FinTech usage often begins with promotional incentives or convenience. However, without trust in platform reliability and institutional protection, such usage tends to remain temporary. When trust is established, adoption evolves from short-term experimentation into more sustainable financial participation. Based on this discussion, the following hypothesis is proposed:

H6: FinTech adoption significantly affects societal sustainability.

Societal Sustainability

Societal sustainability extends beyond short-term economic gains and refers to the capacity of financial systems to promote equity, resilience, and long-term participation. This concept aligns with global development objectives such as Sustainable Development Goals (SDG) 8 and SDG 10, which emphasize inclusive growth and reduced inequality. From this perspective, FinTech is not merely a tool for efficiency, but an enabling infrastructure that can expand economic opportunity and reduce exclusion, provided it operates within a fair and well-governed institutional framework.

Empirical studies highlight the potential of FinTech adoption to contribute to broader societal outcomes, including green innovation, resource efficiency, and circular economic practices (Waqar et al., 2025). Digital finance has also been associated with inclusive growth and poverty reduction by improving access to financial services for underserved populations (Hasan et al., 2024; Campanella et al., 2025). However, the literature consistently emphasizes that technology alone is insufficient. Without strong governance, clear regulatory frameworks, and adequate user literacy, FinTech adoption may remain superficial and fail to translate into meaningful social benefits (Magableh et al., 2025; Dhar et al., 2025). This suggests that sustained societal impact depends not only on adoption levels, but also on the quality of participation supported by institutional and social conditions.

This emphasis on meaningful participation is central to the present study. Societal sustainability is examined from the users' perspective, reflecting whether FinTech engagement is perceived to contribute to broader social outcomes. This issue is particularly relevant in Indonesia, where FinTech adoption among Gen Z and Millennials is high, yet disparities in digital literacy and infrastructure remain evident (OJK, 2024). Within the theoretical framework, Valence Theory suggests that sustainability emerges when users perceive long-term benefits to outweigh risks such as fraud or privacy breaches, while Sustainable Information Society (SIS) Theory highlights the importance of accessible infrastructure and effective consumer protection. Accordingly, societal sustainability is

positioned as the final dependent construct, capturing whether FinTech adoption in Surabaya is viewed as a pathway toward more inclusive and resilient social participation.

3. Research Methods

Research Design and Sample

This study examines FinTech adoption and its implications for societal sustainability among Gen Z and Millennial users in Surabaya, Indonesia. A quantitative descriptive research design was employed to examine the relationships among perceived benefits, perceived risks, financial inclusion, FinTech adoption, and societal sustainability. This approach enables systematic measurement of latent constructs and is appropriate for analysing digital financial behavior in an emerging urban context (Creswell, 2018; Saunders et al., 2023; Hair et al., 2022).

The study population consisted of FinTech users aged 18–44 years residing in Surabaya, Indonesia. These generational groups were selected because they represent the most active FinTech users and play a central role in the diffusion of digital financial services. Their financial activities commonly involve e-wallets, pay-later services, and mobile banking. Purposive sampling was applied to ensure that respondents had relevant experience with FinTech services. To be eligible, participants were required to have actively used FinTech applications within the previous six months. Respondents living outside Surabaya or falling outside the specified age range were excluded. This sampling approach ensured alignment between the sample characteristics and the research objectives (Campbell et al., 2020).

Data Collection and Measurement

A G*Power analysis was conducted to determine the minimum required sample size. Using a medium effect size (0.15), a significance level of 0.05, and a statistical power of 0.85, the minimum sample size required was 123 respondents. Data collection resulted in 142 responses. This sample size exceeds the minimum requirement and is adequate for Partial Least Squares Structural Equation Modeling (PLS-SEM), which is suitable for predictive models involving multiple constructs and moderate sample sizes (Hair et al., 2022).

Data were collected using a structured questionnaire adapted from validated measurement scales in prior FinTech studies. Items measuring Monetary Benefit, Non-Monetary Benefit, Financial Risk, Regulatory Risk, Financial Inclusion, FinTech Adoption, and Societal Sustainability were adapted from Hiew et al. (2024), while Security Risk items were adapted from Li et al. (2023) to capture emerging digital security concerns. In this study, Financial Inclusion is operationalized as users' functional access and capability to utilize formal financial infrastructure, including bank accounts and payment cards, which serve as foundational prerequisites for engaging with FinTech services in an urban digital context. This operationalization aligns with prior capability-based interpretations of financial inclusion in digital finance research. To ensure contextual relevance, references to international platforms were adjusted to reflect commonly used FinTech services in Indonesia. The questionnaire was translated into Bahasa Indonesia using a back-translation procedure to preserve conceptual equivalence, followed by a review by a faculty supervisor to ensure clarity and content validity.

All constructs were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Ethical considerations were addressed at the beginning of the survey, where respondents were informed that participation was voluntary and

anonymous. Data were collected through online distribution via WhatsApp and Instagram, as well as limited offline channels, between July and August 2025.

The final instrument comprised 24 indicators across eight constructs. The complete list of items is presented in Table 1.

Table 1. List of Questionnaire Items

Monetary Benefit
Using FinTech allows me to save money (e.g., discounts, promotions, coupons). Using FinTech enables me to access various financial services at a low cost. Using FinTech allows me to gain financial benefits (e.g., cashback, higher interest, vouchers, rewards).
Non-monetary Benefit
Using FinTech allows me to access financial services more quickly (without physical contact). Using FinTech enables me to use financial services more efficiently (saving time and effort). Using FinTech eliminates time-consuming payment processes and speeds up checkout.
Financial Risk
By using FinTech, I am more vulnerable to financial fraud or payment scams. By using FinTech, I may experience financial loss due to incompatibility with other systems (e.g., banking apps, e-commerce, or other payment platforms). By using FinTech, I may lose money due to exchange-rate fluctuations.
Regulatory Risk
I feel hesitant to use FinTech services because I believe the regulations governing them are still inadequate. Using various FinTech applications becomes difficult due to the lack of clear regulatory guidelines.
Security Risk
I feel uncomfortable or unsafe sharing personal information through FinTech services. I hesitate to use FinTech services because I worry that my account might be hacked or misused by others. I do not feel secure when sending important information through FinTech platforms.
Financial Inclusion
I actively use my personal bank account to manage my financial needs. I find it easy to access my bank account to make payments or transfer funds. I have a debit card that meets my digital transaction needs, such as payments or transfers via mobile apps or POS machines. I have a credit card that meets my digital transaction needs, such as payments or transfers via mobile apps or POS machines.
FinTech Adoption
I frequently use online banking services or perform financial transactions online. I frequently use FinTech applications, such as BCA Mobile, GoPay, ShopeePayLater, and others, to access financial services. I frequently make payments using debit/credit cards or mobile payments (such as e-wallets and mobile banking).
Societal Sustainability
FinTech adoption can reduce social exclusion caused by age, education, location, or disabilities that limit access to financial services. FinTech adoption can enhance personal safety by providing access to information and warnings about risks such as digital fraud or emergency situations. FinTech adoption improves and expands digital literacy, financial knowledge, and financial awareness.

Data Analysis Technique

The proposed research model illustrates the hypothesised relationships among perceived benefits, perceived risks, financial inclusion, FinTech adoption, and societal sustainability. Data analysis was conducted using PLS-SEM with SmartPLS 4.0. This method is appropriate for examining complex relationships involving mediating effects. Bootstrapping with 5,000 resamples was applied to assess the significance of direct and indirect relationships, following the guidelines proposed by Hair et al. (2022).

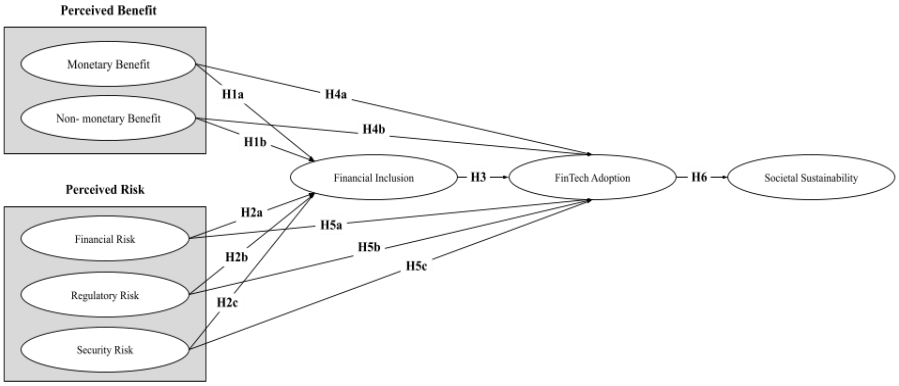

Figure 1. Research Model

4. Results and Discussion

4.1. results

This section presents the results of the SmartPLS 4 analysis, beginning with respondent characteristics and followed by the evaluation of the measurement and structural models.

Respondent Characteristics

Table 2 summarises the demographic profile of the 142 valid respondents. The sample was relatively balanced in terms of gender, with females comprising 51.41% and males 48.59%. The age distribution was dominated by younger users aged 18–28 years (53.52%), followed by the 29-44 age group (46.48%). Engagement with digital finance appears to be deeply integrated into respondents' daily lives. Daily FinTech usage was high, with 95.77% of users reporting everyday engagement. Monthly digital expenditure data indicates significant digital spending power, with 57.04% spending above Rp2,000,000 and 39.44% spending between Rp1,000,000 and Rp2,000,000. Most respondents were employed (78.87%), and half held a bachelor's degree. Overall, this profile reflects a digitally confident and financially active urban demographic, consistent with the broader FinTech landscape in Surabaya.

Table 2. Respondents Characteristics

	Frequency	%
Gender		
Male	69	48.59
Female	73	51.41
Age		
18 - 28 years	76	53.52
29 - 44 years	66	46.48
Frequency of FinTech Usage		
Every day	136	95.77
Almost every day	2	1.41
2-3 times per week	4	2.82

Monthly Digital Expenditure		
> Rp2,000,000	81	57.04
Rp1,000,000 – Rp2,000,000	56	39.44
Rp500,000 – Rp999,999	5	3.52
Employment Status		
Employed	112	78.87
Non-employed	30	21.13
Education Level		
High School	60	42.25
Diploma	10	7.04
Bachelor's Degree	71	50.00
Postgraduate	1	0.70

Measurement Model Evaluation

Indicator Reliability (Loadings)

Indicator reliability was assessed using factor loadings, with 0.70 serving as the minimum acceptable threshold. As presented in Table 3, all retained indicators met this criterion. After measurement model evaluation, three indicators (FI4, SS1, and SR2) were removed due to low loadings (<0.70), resulting in 21 retained indicators. Their removal improved the Composite Reliability and Average Variance Extracted (AVE) values for their respective constructs, consistent with recommended practice (Hair et al., 2022). Consequently, the final model included 21 indicators across eight constructs.

Table 3. Factor loadings

	MB	NMB	FR	RR	SR	FI	FA	SS
MB1	0.809							
MB2	0.812							
MB3	0.713							
NMB1		0.849						
NMB2		0.800						
NMB3		0.749						
FR1			0.800					
FR2			0.836					
FR3			0.702					
RR1				0.932				
RR2				0.933				
SR1					0.893			
SR3					0.936			
FI1						0.901		
FI2						0.781		
FI3						0.731		
FA1							0.908	
FA2							0.793	
FA3							0.906	
SS2								0.780
SS3								0.907

Internal Consistency & Convergent Validity (CR, AVE)

Internal consistency was evaluated using Cronbach's Alpha and Composite Reliability (CR). While Alpha values for MB, FR, and SS were slightly below 0.70, this metric is known to be sensitive to the number of items in a scale. Hair et al. (2021) note that it often underestimates

reliability for constructs with fewer indicators. Therefore, we prioritized Composite Reliability as the more accurate metric. As shown in Table 4, all CR values exceeded 0.70, confirming the model's internal consistency.

Table 4. Reliability and Convergent Validity

	Cronbach's Alpha	AVE	CR
Monetary Benefit	0.675	0.607	0.822
Non-monetary Benefit	0.721	0.640	0.842
Financial Risk	0.689	0.611	0.824
Regulatory Risk	0.850	0.870	0.930
Security Risk	0.808	0.837	0.911
Financial Inclusion	0.750	0.652	0.848
FinTech Adoption	0.840	0.758	0.904
Societal Sustainability	0.615	0.716	0.833

Discriminant Validity (HTMT)

Discriminant validity was examined using the Heterotrait-Monotrait Ratio (HTMT). As displayed in Table 5, all HTMT values remained well below the 0.85 threshold, demonstrating strong discriminant validity and confirming that the constructs are empirically distinct from one another.

Table 5. Heterotrait-Monotrait Ratio (HTMT)

	MB	NMB	FR	RR	SR	FI	FA	SS
MB								
NMB	0.598							
FR	0.457	0.270						
RR	0.362	0.572	0.265					
SR	0.116	0.126	0.522	0.225				
FI	0.526	0.485	0.209	0.258	0.308			
FA	0.500	0.526	0.168	0.458	0.234	0.507		
SS	0.308	0.288	0.197	0.228	0.219	0.249	0.172	

Structural Model Assessment

Figure 2 presents the structural model tested in this study, illustrating the relationships among perceived benefits, perceived risks, financial inclusion, FinTech adoption, and societal sustainability. All constructs were modelled reflectively and assessed using 5,000 bootstrap resamples.

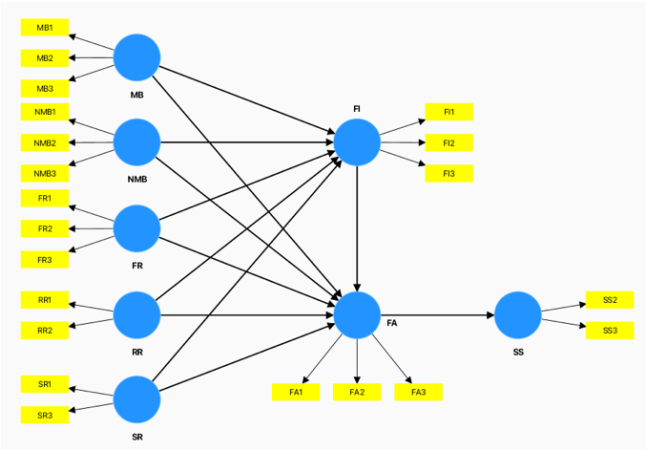

Figure 2. SmartPLS 4 analysis

Direct Effects (Path Coefficients)

The path-coefficient estimates are reported in Table 6. Regarding perceived benefits, Monetary Benefit (MB) showed a significant positive effect on Financial Inclusion (FI) (β = 0.319; t = 3.547; p < 0.001). However, its direct effect on FinTech Adoption (FA) was not significant (p = 0.052). Similarly, Non-Monetary Benefit (NMB) significantly influenced FI (β = 0.226; t = 2.464; p = 0.014) but did not significantly affect FA directly (p = 0.106). These results indicate that benefits primarily shape whether users feel included in the financial system rather than directly triggering usage.

In contrast to benefits, the impact of perceived risks was more varied. Security Risk (SR) significantly reduced FI (β = –0.266; t = 3.253; p = 0.001), implying that concerns about digital safety discourage broad financial participation. However, SR did not significantly influence FA directly (p = 0.158). Financial Risk (FR) had no significant impact on either FI (p = 0.315) or FA (p = 0.494). This suggests that worries about potential monetary loss may carry less weight among this digitally confident demographic. Regulatory Risk (RR) behaved differently. It did not significantly affect FI (p = 0.649) but did significantly reduce FA (β = –0.202; t = 2.197; p = 0.028). This indicates that uncertainty about regulation affects actual usage behavior more than the perception of access.

In terms of behavioral outcomes, FI significantly predicted FA (β = 0.304; t = 3.280; p = 0.001), supporting its theorized role as a behavioral pathway linking perceptions to usage. Meanwhile, FA did not significantly influence Societal Sustainability (SS) (β = 0.125; t = 1.300; p = 0.194), indicating that individual usage does not necessarily translate into broader sustainability outcomes.

Table 6. Path Coefficients (direct effects)

Hypothesis	Original Sample	T Statistic	P Values	Results
MB → FI	0.319	3.547	0.000	Accepted
NMB → FI	0.226	2.464	0.014	Accepted
FR → FI	0.097	1.006	0.315	Rejected
RR → FI	-0.042	0.455	0.649	Rejected
SR → FI	-0.266	3.253	0.001	Accepted
FI → FA	0.304	3.280	0.001	Accepted
MB → FA	0.166	1.945	0.052	Rejected
NMB → FA	0.144	1.615	0.106	Rejected
FR → FA	0.080	0.684	0.494	Rejected
RR → FA	-0.202	2.197	0.028	Accepted
SR → FA	-0.100	1.413	0.158	Rejected
FA → SS	0.125	1.300	0.194	Rejected

Mediation Effects (Specific Indirect Effects)

The mediation results in Table 7 highlight the role of Financial Inclusion as a mechanism connecting user perceptions to adoption. FI significantly mediated the effects of Monetary Benefit (p = 0.023), Non-Monetary Benefit (p = 0.026), and Security Risk (p = 0.023) on FA. These findings suggest that users adopt FinTech when they feel capable, supported, and confident navigating digital finance systems. In contrast, neither Financial Risk nor Regulatory Risk showed significant indirect effects, consistent with their limited direct influence on inclusion. Overall, inclusion processes appear to be a stronger pathway to adoption than direct perception effects alone.

Table 7. Specific Indirect Effect

Hypothesis	Original Sample	T Statistic	P Values	Results
MB→FI→FA	0.097	2.282	0.023	Accepted
NMB→FI→FA	0.069	2.231	0.026	Accepted
FR→FI→FA	0.030	0.916	0.360	Rejected
RR→FI→FA	–0.013	0.419	0.675	Rejected
SR→FI→FA	-0.081	2.278	0.023	Accepted

Predictive Power (R^2, Q^2)

As shown in Table 8, the model explains a moderate amount of variance for FI (R^2 = 0.276) and FA (R^2 = 0.358), indicating that the identified drivers effectively capture the dynamics of inclusion and adoption among young users. However, SS showed a very low R^2 (0.016). This low explanatory power strongly suggests that broader sustainability outcomes depend more on system-level enablers, such as public policy, digital literacy programs, and infrastructure, than on individual usage patterns alone.

Table 8. R Square and R Square Adjusted

	R Square	R Square Adjusted
Financial Inclusion	0.276	0.249
Fintech Adoption	0.358	0.330
Societal Sustainability	0.016	0.009

Table 9 presents the Q^2 values. FI (0.133) demonstrated small-to-moderate predictive relevance, while FA (0.237) showed medium predictive relevance. SS recorded no predictive relevance (–0.007), reinforcing the finding that societal sustainability is likely shaped by collective and institutional factors rather than personal adoption.

Table 9. Predictive Relevance (Stone–Geisser Test)

	Q Square	Predictive Relevance
Financial Inclusion	0.133	Small-Medium
FinTech Adoption	0.237	Medium
Societal Sustainability	-0.007	None

Overall, the results demonstrate that perceived benefits, both monetary and non-monetary, are the strongest drivers of Financial Inclusion among Gen Z and Millennials in Surabaya, aligning with Valence Theory's emphasis on positive outcome evaluations. Security concerns undermine participation and indirectly dampen adoption, whereas financial and regulatory risks show selective effects: financial risk shows no significant behavioral impact, while regulatory ambiguity directly reduces adoption.

Financial Inclusion emerges as the central behavioral channel through which users convert value perceptions into actual FinTech use. However, the lack of significant impact on Societal Sustainability suggests that adoption alone is insufficient. Consistent with Sustainable Information Society Theory, systemic factors such as governance quality, inclusive infrastructure, and population-wide capability building play a more prominent role in achieving broader societal goals.

4.2. Discussion

This section interprets the empirical findings by linking the observed adoption patterns among Gen Z and Millennial users in Surabaya to the proposed hypotheses and relevant FinTech literature. The results highlight a clear distinction between how monetary and non-monetary benefits shape FinTech participation among young users in Surabaya. While monetary incentives significantly influence financial inclusion, they do not significantly influence FinTech adoption directly. This pattern aligns with earlier studies showing that digital-finance participation grows when users perceive clear economic or experiential advantages (Hoque et al., 2024; Saif, 2024). However, the results suggest that cashback and promotions function primarily as entry incentives; they draw users into the ecosystem but rarely sustain ongoing behavior on their own (Ramayanti et al., 2023).

In contrast, non-monetary benefits, particularly convenience, speed, and reliability, play an important role in shaping users' engagement indirectly. Rather than exerting a direct influence on FinTech adoption, these experiential benefits significantly strengthen Financial Inclusion, which in turn facilitates sustained usage. This finding indicates that continued engagement among digital natives is driven not by immediate incentives, but by users' perceived capability and confidence in navigating digital financial services. For digital natives, the primary value proposition of FinTech is operational efficiency rather than financial gain. When a service integrates seamlessly into a user's routine, it reduces the effort required to manage finances and strengthens users' sense of capability and inclusion. Consequently, users continue to participate through this enhanced sense of readiness, not merely because the platform offers rewards. This pattern mirrors prior evidence suggesting that experiential value plays a more important role in sustaining engagement, particularly among younger digital users (Setiawan et al., 2023; Hassan et al., 2025).

The participants also demonstrated a selective approach to risk, distinguishing clearly between operational friction and institutional legitimacy. Security risk acted as a barrier to entry, significantly reducing financial inclusion. This echoes regional evidence that concerns about data safety and cyber-fraud remain decisive in shaping whether individuals feel confident participating in digital finance (Jafri et al., 2024; Rahman et al., 2024). However, once users enter the ecosystem, security concerns no longer significantly impact their daily adoption. This suggests a threshold effect where heightened familiarity reduces the behavioral impact of security concerns (Zhang et al., 2023).

Financial risk showed no significant impact on behavior, likely due to the high digital familiarity of this demographic; young, urban users appear to view minor transaction errors as manageable operational issues rather than fundamental threats (Ly, 2024). Conversely, regulatory risk directly reduced adoption. This is a critical finding, aligning with research showing that uncertainty around data governance and licensing can discourage deeper usage despite easy access (Li et al., 2023; Fidhayanti et al., 2024). This reflects a sophisticated form of consumer judgment where users differentiate between a flawed app and an illegitimate business.

Financial inclusion emerged as the primary enabling mechanism linking these perceptions to behavior, indicating that adoption is not merely a response to marketing features alone but a result of user capability. Consistent with research framing inclusion as a capability-based condition (Ha et al., 2025; Ismail et al., 2024), users were more likely to adopt FinTech when they perceived themselves as capable, informed, and able to navigate digital systems confidently. The fact that benefits and security perceptions influenced adoption only through inclusion suggests that confidence is a critical prerequisite for

engagement. In this context, users do not move directly from observing a benefit to adopting a technology; they first need to feel that they have the access, skills, and agency to navigate the system. This reinforces the view that market penetration relies on empowering users to feel competent within the digital environment. It is important to note that financial inclusion in this study reflects users' capability to access and utilize formal financial infrastructure necessary for digital transactions, rather than broader welfare-oriented inclusion outcomes.

While individual adoption reflects personal readiness, societal sustainability reflects broader structural and systemic outcomes. However, the analysis revealed a non-significant relationship between FinTech adoption and societal sustainability, challenging the assumption that increased digital usage automatically translates into social good. The results indicate that while adoption rates in Surabaya are high, this usage remains primarily transaction-oriented. Users engage with FinTech for personal convenience, but these individual actions do not necessarily translate into broader societal outcomes like equity or resilience. This supports Sustainable Information Society (SIS) Theory and global evidence noting that societal value depends heavily on complementary systems, such as digital literacy programs and inclusive infrastructure, rather than usage alone (Campanella et al., 2025; Hasan et al., 2024). Without a supportive ecosystem, high adoption rates represent market activity rather than societal progress (Dhar et al., 2025; Magableh et al., 2025).

Strategically, these findings imply a need for firms to shift their focus from acquisition to retention. Since monetary rewards do not drive long-term adoption, managers should redirect budgets from customer acquisition incentives toward product reliability and User Experience (UX). Evidence consistently shows that engagement endures when systems feel easy to navigate and trustworthy (Hoque et al., 2024; Jaiswal et al., 2023). Furthermore, since regulatory risk is a significant barrier, companies should view compliance not as a legal obligation but as a strategic asset. Firms that visibly display their licensing and adhere to consumer protection standards can use institutional trust as a differentiator to capture risk-sensitive users. For policymakers, the findings highlight that adoption alone is insufficient for sustainability. Policy intervention is required to bridge the gap between usage and social impact, focusing on frameworks that encourage the productive use of FinTech rather than just consumption.

5. Conclusion

This study examined the dynamics of FinTech adoption among Gen Z and Millennials in Surabaya, positioning financial inclusion as the mediating pathway between individual perceptions and societal sustainability. The findings reveal a clear pattern regarding the drivers of digital finance: experiential value appears to play a more prominent role than monetary incentives in sustaining engagement.

The analysis demonstrates that while monetary rewards successfully pull users into the ecosystem (Financial Inclusion), they fail to sustain long-term usage (Adoption). For digitally confident young users, economic incentives function merely as entry tickets; true retention is driven by operational efficiency, system reliability, and convenience. At the same time, risk perceptions operate selectively. Security concerns act as a gatekeeper for initial entry, whereas regulatory uncertainty specifically erodes the trust required for deep, continued usage. Notably, financial risk showed no impact, indicating that this urban cohort views minor operational errors as manageable frictions rather than fundamental threats.

Conceptually, this study advances Valence Theory by identifying a hierarchy of value. In highly digital environments, perceived capability and ease of use carry significantly more

weight than purely economic calculations. Furthermore, the study validates the role of Financial Inclusion not just as a status, but as a capability-based channel that converts evaluations into behavior. Significantly, the non-significant relationship between adoption and societal sustainability provides empirical support for Sustainable Information Society (SIS) Theory. It substantiates the argument that high adoption rates are a necessary but insufficient condition for social good. Without broader enablers, such as governance quality and infrastructure, technology remains a tool for personal convenience rather than a driver of societal resilience.

For the FinTech industry, these findings signal the limitations of incentive-dependent growth strategies, suggesting that providers must pivot toward product-led retention supported by reliability, usability, and regulatory transparency to sustain long-term engagement. The competitive advantage now lies in reducing friction and ensuring visible regulatory compliance, which serves as a strategic asset in a low-trust environment. For policymakers, the message is clear: access does not equal impact. Since widespread usage does not necessarily lead to societal sustainability, governance must focus on strengthening consumer protection and digital literacy. Policies should aim to transform FinTech from a consumption channel into a productive tool for financial health.

These conclusions should be viewed alongside the study's limitations. First, while the sample size (n=142) was sufficient for the predictive nature of PLS-SEM, a larger sample would allow for more robust generalization. Second, the focus on young, urban users in Surabaya limits generalizability to rural or older populations who may possess different risk sensitivities. Additionally, the cross-sectional design captures a snapshot of behavior rather than its evolution over time. Future research should consider longitudinal designs to track how user risk tolerance shifts as the market matures. Finally, future studies should explore institutional variables, such as governance quality or financial literacy education, to identify the specific mechanisms needed to transform digital adoption into sustainable societal outcomes.

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